

PATENT SPECIFICATION

372,397



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PROVISIONAL SPECIFICATION.

Improvements in or relating to Roll Film Cameras and a Method of Manipulating Films therein.

We, KODAK LIMITED, a Company registered under the Laws of Great Britain and CHARLES ZOPHER CASE, Citizen of the United States of America, both of Kodak House, Kingsway, London, W.C. 2, do hereby declare the nature of this invention to be as follows:—

This invention relates to roll film cameras and a method of manipulating films therein, and has for its object to simplify the construction of the camera as well as the feeding of the film past the exposure aperture and the insertion and withdrawal of the film spool.

To this end according to the present invention a single spool on which is wound a film for exposure within a roll film camera is first inserted in a spool chamber located at one side of the exposure chamber in the camera, the spool being then rotated in one direction thereby causing the film to be pushed past the exposure aperture in the camera into a film receiving chamber, the spool being subsequently rotated in the opposite direction to rewind the film on the spool, exposures being made at positions of the film during its travel out of or during its rewinding into the spool chamber.

Thus, a roll film camera according to the present invention comprises a film receiving chamber and a spool chamber disposed oppositely on either side of and both communicating with the exposure chamber, the film receiving chamber being wholly closed except for an opening which communicates with the exposure chamber, and means whereby rotation in one direction of the spool in the spool chamber will cause the film to be pushed through the intermediate exposure chamber into the film receiving chamber, whence the film can be subsequently withdrawn and rewound upon the spool by rotating the latter in the opposite direction. Preferably the spool is rotated to push the film through the exposure chamber into its first exposure position, the film being then fed further through the exposure chamber towards the film receiving chamber after each exposure has been made. If desired, however, substantially the whole of the film may be pushed through the

exposure chamber by rotation of the spool before any exposures are made, the first exposure then being made on the portion of the film lying nearest the spool and a predetermined length of the film being rewound on to the spool after each exposure.

The arrangement is preferably such that the opening or openings in the outer wall of the spool chamber which are necessary for the insertion of the spool are closed by a part or parts of the spool when this is in position in the spool chamber.

Conveniently a guide is provided for leading the film past the exposure aperture, the spool chamber communicating with one end of this guide and the film receiving chamber communicating with the other end of the guide, and in order to facilitate the pushing of the film out of the spool chamber along the guide past the exposure aperture and into the film receiving chamber, a resiliently supported member is provided within the spool chamber adapted to bear on the outer surface of the film, the arrangement being such that the friction thus created between adjacent convolutions of the film is greater than that between the film and the resiliently supported member. The spool may carry one or more pins or projections which extend through suitably spaced perforations in the film, preferably adjacent to its edge, when it is wound on the spool and thus assists the pushing of the film out of the spool chamber.

In some cases instead of the spool being inserted directly into the spool chamber, the spool may be enclosed in a carton or like container and the spool, together with this carton, may be inserted into the spool chamber, the carton having a slot in its wall through which the film can then be fed by rotation of the spool within the carton so that the film is pushed through the exposure chamber. In such an arrangement the spool chamber is preferably so shaped or formed in relation to the spool-containing carton that this carton can only be inserted within the spool chamber when the slot in the

wall of the carton is in a determined position relatively to the opening in the spool chamber through which the film is to be pushed.

5 In any case the insertion of the spool with or without its enclosing carton is preferably effected from one end of the spool chamber, and when the spool is adapted to be inserted directly into the
10 spool chamber the flange on the spool which lies adjacent to the open end of the spool chamber when the spool is in position therein, may serve to close the open end of the spool chamber.

15 A camera according to this invention is preferably not provided with any means for rotating the spool, the end of the spool itself having a part permanently connected thereto or formed thereon whereby
20 the spool can be rotated when inserted in the spool chamber.

The film may either be provided with a lead strip or not and preferably is not provided with a paper backing but has
25 applied to the surface thereof remote from the sensitive emulsion a dye-stuff which is impervious to actinic rays, so that when the film is wound upon its spool, actinic rays cannot reach the sensi-
30 tive surface.

The camera may be constructed in various ways but the body of the camera

containing the spool chamber and the film receiving chamber is preferably formed of the substance known under the registered trade mark "Bakelite" or of like
35 moulded substance, since such substance permits easy travel of the film through the exposure chamber with little friction. The camera may be either of the fixed
40 or adjustable focus type and in the latter case the objective is conveniently carried at the outer end of a tube in telescopic engagement with a second tube rigidly
45 mounted on the camera body so that focussing can be effected by relative movement between the two tubes. If desired, however, the objective shutter and like mechanism may be carried by a member supported by the body of the camera and
50 connected to the exposure aperture by a "bellows" in the usual manner. The view-finder may be mounted upon the body of the camera but where the camera is formed from "Bakelite" or like
55 moulded material a housing for the view-finder is preferably formed in the camera body during the moulding process, the view-finder being inserted into this
60 housing.

Dated this 7th day of February, 1931.
KILBURN & STRODE,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Roll Film Cameras and a Method of Manipulating Films therein.

We, KODAK LIMITED, a Company registered under the Laws of Great Britain and CHARLES ZOPHER CASE, Citizen of the United States of America,
65 both of Kodak House, Kingsway, London, W.C. 2, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the
70 following statement:—

This invention relates to roll film cameras and a method of manipulating films therein, and has for its object to
75 simplify the construction of the camera as well as the feeding of the film past the exposure aperture and the insertion and withdrawal of the film spool.

To this end according to the present invention a single spool on which is wound a film for exposure within a roll
80 film camera, is first inserted in a spool chamber located at one side of the exposure chamber in the camera, the spool being then rotated, thereby causing
85 the film to be pushed past the exposure chamber in the camera into a film-receiv-

ing chamber. If desired the film may then be removed from the film-receiving chamber without rewinding, in which
90 case exposures are made at positions of the film during its travel out of the spool chamber. Preferably, however, after unwinding the spool as described above, the spool is subsequently rotated in the opposite direction to rewind the film on
95 the spool, in which case exposures may be made at positions of the film during its travel out of or during its rewinding into the spool chamber.

Thus, a roll film camera according to
100 the present invention comprises a film-receiving chamber and a spool chamber disposed oppositely on either side of and both communicating with the exposure chamber, and means whereby the film can
105 be fed through the intermediate exposure chamber into the film-receiving chamber solely by rotating the spool in the spool chamber to unwind the film thereon. Means may be provided whereby the film
110 can be withdrawn from the film-receiving chamber without being rewound on the

spool, in which case the exposures are made at positions of the film during its travel out of the spool chamber. Preferably, however, the arrangement is such that the film, after being pushed through the exposure chamber into the film-receiving chamber by rotation of the spool in one direction, can subsequently be withdrawn and rewound upon the spool by rotating the latter in the opposite direction, and in this case the spool is preferably rotated to push the film through the exposure chamber into its first exposure position, the film being then fed further through the exposure chamber towards the film-receiving chamber after each exposure has been made. If desired, however, substantially the whole of the film may be pushed through the exposure chamber by rotation of the spool before any exposures are made, the first exposure then being made on the portion of the film lying nearest the spool, and a predetermined length of the film being rewound on the spool after each exposure.

Conveniently one or more guides are provided for the film as it leaves the spool chamber, these guides acting to lead the film across the exposure aperture and to maintain the part of the film in the exposure chamber in the correct plane. Preferably the positive feeding of the film by rotation of the spool is ensured by a resiliently supported roller or other member which bears on the outer surface of the film on the spool, the arrangement being such that the friction thus created between adjacent convolutions or layers of the film on the spool is greater than that between the film and the resiliently supported member so that the film is pushed out of the spool chamber through the exposure chamber. The spool may also carry one or more pins or projections which, when the film is wound on the spool, extend through suitably spaced perforations therein, preferably adjacent to the edge of the film, thus further assisting the pushing of the film through the exposure chamber.

In one arrangement the spool is inserted directly into the spool chamber, the opening or openings in the outer wall of the spool chamber, which are necessary for the insertion of the spool, being closed by a part or parts of the spool when this is in position in the spool chamber, while the spool itself is provided with a handle at one end which lies outside the camera and enables the spool to be rotated when in position in the camera.

In this arrangement when the spool is inserted into the spool chamber care would be taken to see that the free edge of the film was in the correct position for

passing out of the spool chamber into the guide or the like for leading it across the exposure chamber.

Alternatively in some cases instead of the spool being inserted directly into the spool chamber, the spool may be enclosed in a carton or like container and the spool, together with this carton, may be inserted into the spool chamber, the carton having a slot in its wall through which the film can then be fed by rotation of the spool within the carton so that the film is pushed through the exposure chamber. In such an arrangement the spool chamber is preferably so shaped or formed in relation to the spool-containing carton that this carton can only be inserted within the spool chamber when the slot in the wall of the carton is in a determined position relatively to the opening in the spool chamber or the end of the guide member through which the film is to be pushed.

The resiliently supported roller or member is mounted in the spool chamber of the camera in the arrangement in which the spool is inserted directly into the camera and in the carton when this carton is adapted to be inserted into the camera with the spool. In any case the insertion of the spool, with or without its enclosing carton, is preferably effected from one end of the spool chamber, and, when the spool is adapted to be inserted directly into the spool chamber, a flange-like part on the end of the spool which lies adjacent to the open end of the spool chamber when the spool is in position therein, may serve to close the open end of the spool chamber.

Various means may be provided to indicate when the proper film areas are in position for exposure.

The invention may be carried into practice in various ways, but one construction and a modification thereof, according to this invention are illustrated somewhat diagrammatically by way of example in the accompanying drawings, in which

Figure 1 is a plan view of a camera according to this invention,

Figure 2 is a side elevation of the top of the camera and spool chamber employed in the camera shown in Figure 1, these parts being shown removed from the body of the camera,

Figure 3 is a section on the line 3—3 of Figure 2 but with the body of the camera also shown,

Figure 4 is a side elevation on a reduced scale of a film spool for use in the camera shown in Figures 1, 2 and 3.

Figure 5 is a similar view to Figure 4 showing a somewhat modified form of film

spool for use in a camera according to this invention,

Figure 6 is a plan view of a length of film such as may be used with the film spool shown in Figure 5,

Figure 7 is a detail view partially in section showing a construction which may be adopted for retaining the film spool in position within the camera illustrated,

Figure 8 is a detail sectional view, somewhat similar to Figure 7, showing the joint between the end of the spool and the camera casing,

Figure 9 is a cross-section of a removable film-receiving chamber,

Figure 10 is a side elevation of a film spool assembly for the modified construction in which the spool containing carton is inserted into the camera with the spool,

Figure 11 is a cross-section on the line 11-11 of Figure 10 on a somewhat enlarged scale,

Figure 12 is a longitudinal section on the line 12-12 of Figure 11,

Figure 13 is a plan view showing diagrammatically the spool assembly of Figure 10 in position in the camera, and,

Figure 14 shows diagrammatically a light-lock or packing which may be used for rendering light-tight the joint between the film-spool assembly of Figure 10 and the camera.

In the construction illustrated the camera comprises a front wall 1 and a rear wall 2 connected by semi-cylindrical curved end walls 3 and 4, the curved end wall 4 being provided with a part-cylindrical continuation 5 formed as shown to provide a substantially cylindrical film chamber within the camera. The body of the camera is completed by a lower wall 7 and an upper wall 8, the upper wall 8 having a downwardly extending flange 9 round its edge adapted to cooperate and form a light-tight joint with the upper edge 9' of the front, rear and end walls as shown in Figure 1.

Carried by and extending downwards from the upper wall 8 at the end thereof remote from the film-receiving chamber 5 is a spool chamber designated broadly 10. This chamber comprises a circumferential wall 11 formed from a strip of metal, wood or other material the ends 12, 13 of which overlap and are spaced apart so as to provide between them a light-proof passage 14 through which a film can pass from the chamber. The chamber is also provided with a radial extension or pocket 15 in which is mounted a resilient support 16 carrying a roller 17 in such a manner as normally to force this roller towards the hub 18 of a spool mounted within the chamber so that the roller bears on the film on the spool. Mounted on the front

wall 1 is a tubular support 45 for the camera objective, and on the rear wall opposite to this objective are provided upper and lower channel-like guides 6 extending between the spool chamber 10 and the film-receiving chamber 5 and adapted to support and guide the portion of film extending between these two chambers.

The film spool itself may be formed, for example, as shown in Figure 4 or as shown in Figure 5. In the construction shown in Figure 4 the spool 18, which may be formed of wood, sheet metal or other material, is provided with a slot 19 in which the end of the film is adapted to be secured and with end flanges 20 in the usual manner. The spool proper 18 is mounted upon a spindle the lower end 21 of which projects beyond the lower flange 20 while the upper end carries a hub 24 to which is secured a knurled head 25 having a flange 26 and constituting a handle whereby the spool can be rotated.

In the alternative construction shown in Figure 5 the spool proper 118 is provided with a slot 119 and with end flanges 120 and is mounted on a spindle the lower end 121 of which projects beyond the lower flange 120. In this construction also the upper end of the spindle is rigidly connected to a drum 124 carrying a knurled head 125 whereby the spool can be rotated, but instead of the connection between the film and the spool being only by reason of the end of the film engaging the slot 119, a radial pin or projection 122 is mounted or formed on the spool 118 and is adapted to engage a series of holes 123 formed as shown in the film F' illustrated in Figure 6. It will be appreciated that two or more projections or teeth 122 may be provided if desired, a corresponding number of holes 123 being formed in the film, and that the distances *a*, *b*, *c*, *d* and *e* between the aperture 123 will vary throughout the length of the film, the extent of variation depending upon the thickness of the film and the diameter of the spool 118.

Means are preferably provided for preventing accidental removal of the film spool from the film chamber, these means comprising for example a radial pin 31 extending from a flange 30 which constitutes the aperture or passage-way through which the film is inserted into the camera, this pin being adapted to enter a groove 27 in the flange 26 of the knurled head 25 through a slot or notch 28 therein when the film spool is inserted in the camera, so that the subsequent rotation of the spool will cause engagement of the pin and groove 27 to prevent accidental removal of the film spool from the camera

The flange 30 on the camera casing also acts, as shown in Figure 8, to ensure that the joint between the upper end of the spool and the casing is light-tight since this flange projects into the space between the spool hub 24 and the flange 26 of the knurled head 25.

Further the film F or F' may be provided with a short length of packing paper to protect it from light before insertion in and after withdrawal from the camera, or may be provided with a dyed end which will prevent harmful light from reaching and fogging the inner convolutions of the film, such an arrangement being wellknown per se.

The operation of the camera according to this invention with either of the constructions of film spool shown is as follows:—

The film spool is inserted into the film chamber 10 from its open end and is pressed home so that the end 21 of the film spool spindle extends through a hole 22 in the lower end of the film chamber and a hole 23 in the lower wall of the camera, the pin 31 entering the notch 28. In thus inserting the spool care should be taken to ensure that the free end of the film lies between the member 16, 17 and the slot 14. The knurled head 25 is then rotated so as to rotate the spool, the pin 21 entering the groove 27 thereof to prevent unintentional removal of the spool from the camera. This rotation by reason of the action of the spring-pressed roller 17 on the outer convolution of the film F, F' causes the end of the film to be pushed through the opening 14 into the guide channels 16. Further rotation of the spool now causes the film to travel along these guide channels into the film-receiving chamber 5. Exposures may be made at suitable film positions during its travel out of the spool chamber, or alternatively the film may be substantially completely unwound from the spool and pushed into the film-receiving chamber by rotation of the spool in one direction before any exposures are made, the exposures being made at positions of the film as it is being withdrawn from the film-receiving chamber and rewound on the spool by rotation thereof in the other direction.

When the film is to be completely unwound into the film-receiving chamber 9' and not rewound on the spool, this chamber 9' is, as shown in Figure 9, formed as a removable carton having a circumferential wall 32 the ends of which overlap to form a slot through which the film passes into the carton. The edges of the slot are lined with plush or like material 33 in order to render the cham-

ber light-tight. The inner end of the film on the spool, is of course provided with a sufficient length of paper or other insensitive material for the sensitive film to be pushed entirely within the receiving carton by rotation of the spool in the spool chamber.

When the construction of film spool shown in Figure 5 is employed, the roller 17 may be of such length that it will lie between the tooth or projection 122 and the lower flange 120, or this roller may be grooved to provide a passage-way for the tooth 122. Since this latter arrangement necessitates an increased diameter of the roller, however, the former arrangement is usually preferred.

In the modified construction shown in Figures 10 to 14 in which the spool is contained in a carton adapted to be inserted into the camera with the spool, the film spool assembly comprises a substantially cylindrical housing or carton 41 of metal, cardboard or other suitable material having the ends 42 and 43 of the sheet of material forming the circumferential wall of the carton overlapping and spaced apart as shown so as to provide an arcuate-shaped opening or slot 44 through which the film F can pass from the interior of the carton. The base of the carton is provided with an aperture 46 as shown in Figure 12 to receive a trunnion 47 formed integral with or rigidly mounted on the lower end of a hub 48 constituting the film spindle. The upper end of the hub 48 has a head 49 with a knurled portion 50 which is adapted to lie outside the camera and to constitute the handle for rotating the film spindle or hub within the carton. Coiled round the hub 48 is the film F its inner end being held in a slot in the hub and its outer end being adapted to pass through the slot when the hub or spindle is rotated by turning the knurled head 49.

In order to ensure that the film can be pushed out of the carton across the exposure chamber of the camera solely by rotating the spool a roller 51 resiliently mounted on a spring 52 is so disposed within a radial pocket or extension 54 of the wall of the carton that this roller bears on the outside convolution of the film on the spool and maintains the other convolutions or layers of films in intimate contact with one another. The spring 52 is in the form of a leaf spring having spring and slot connections at 53 with the outer wall of the pocket 54 as is clearly shown in Figure 3.

It will be apparent that when the spool is rotated the hub 48 and the roller 51 act on the part of the film lying between them after the manner of wringer rollers

so as to push the film out through the slot 44.

In order that the slot 44 may be correctly positioned when the carton is inserted in the camera, the camera is provided as shown in Figure 13, with a recess 55 adapted to receive the radial extension 54 of the carton. The carton can thus be inserted in the camera only with the slot 44 in the position in which the film as it leaves this slot will enter the guides 56 which hold the film in the correct position as it moves across the exposure chamber into the film-receiving chamber 57. As shown in Figure 14 the joint between the top of the carton and the camera casing is maintained light-tight by means of a pair of jaws 58 which are pivoted at 59 to the camera top 60 and faced with plush or other light-tight material, these jaws being adapted to engage beneath the knurled portion 50 of the spool handle 49. If desired the hub 48 may be provided with one or more radial pins or projections, similar to the pin 122, which pass through holes in the convolutions of film on the spool, such pin or pins assisting in feeding the film from the carton as the spool is rotated.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a roll film camera, the combination with a chamber in which is the exposure aperture, of a film-receiving chamber and a spool chamber disposed oppositely on either side of and both communicating with the exposure chamber, and means whereby the film can be fed through the intermediate exposure chamber into the film-receiving chamber solely by rotating the spool in the spool chamber to unwind the film thereon.

2. A method of manipulating a film for exposure within a roll film camera, according to which a single spool on which the film is wound is first inserted in a spool chamber located at one side of the exposure chamber in the camera, the spool being then rotated to cause the film to be pushed past the exposure aperture in the camera into a film-receiving chamber.

3. In a roll film camera, the combination with a chamber in which exposure of the film takes place, of a film-receiving chamber and a spool chamber disposed oppositely on either side of and both communicating with the exposure chamber, the film-receiving chamber preferably being approximately cylindrical and being wholly closed except for an opening which communicates with the exposure chamber, and means whereby the film can

be fed through the intermediate exposure chamber into the film-receiving chamber solely by rotating the spool in the spool chamber to unwind the film thereon, the film being subsequently withdrawn and rewound on the spool by rotating the latter in the opposite direction.

4. A method of manipulating a film for exposure within a roll film camera, according to which a single spool on which the film is wound is first inserted in a spool chamber located at one side of the exposure chamber in the camera, the spool being then rotated in one direction thereby causing the film to be pushed through the exposure chamber into a film-receiving chamber, the film being subsequently rewound by rotating the spool in the opposite direction, exposures being made either on the passage of the film to or from the spool chamber.

5. A roll film camera as claimed in Claim 1 or Claim 3, in which the spool chamber has in its outer wall one or more openings for insertion and removal of the spool, such opening or openings being adapted to be closed by part or parts of the spool when in position in the camera.

6. A roll film camera as claimed in Claim 1 or Claim 3 or Claim 5 in which one or more guides are provided for the film as it leaves the spool chamber, these guides acting to lead the film across the exposure aperture and to maintain the film in the exposure chamber in the correct plane.

7. A roll film camera as claimed in Claim 1 or Claim 3 or Claim 5 or Claim 6 in which the positive feeding of the film by rotation of the spool is ensured by a resiliently supported roller or other member which bears on the outer surface of the film on the spool, this member being mounted in the spool chamber of the camera or in a carton or container for the spool inserted into and removable from the spool chamber of the camera with the spool and having a slot in its wall through which the film is fed.

8. A roll film camera as claimed in Claim 1 or Claim 6, in which the circumferential wall of the spool chamber is formed from a strip of metal or other material the ends of which overlap but are spaced apart so as to provide a passage through which the end of the film can pass from the chamber.

9. A roll film camera as claimed in Claim 5 or Claim 6 or Claim 7 in which the spool chamber is so shaped in relation to a spool-containing carton or the like to be inserted therein, that this carton can only be inserted within the spool chamber when the slot in the carton is in a determined position relatively to the adjacent

end of the guide for leading the film through the exposure chamber.

10. A roll film camera as claimed in Claim 5 or Claim 6 or Claim 7, in which the spool chamber is open at one end to permit insertion of the spool, the portion of the spool chamber adjacent to its open end being so formed in relation to the end of a spool member to be inserted therein that when the spool member is inserted within the camera a part on the outer end of the spool member which projects outside the camera will form a light-tight

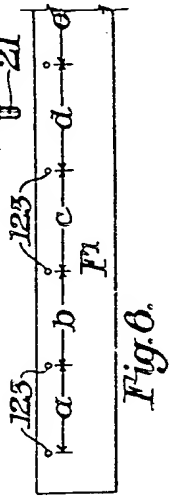
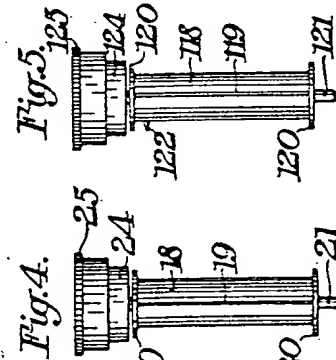
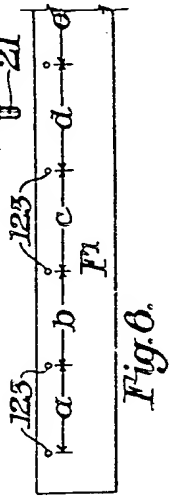
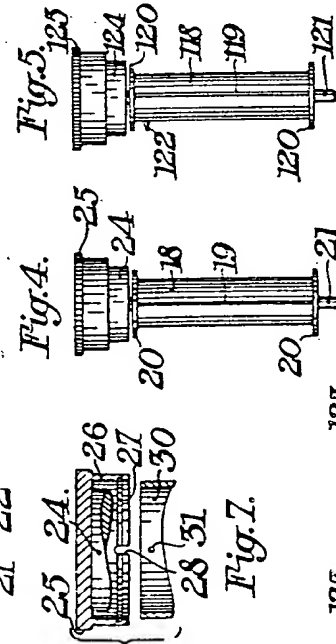
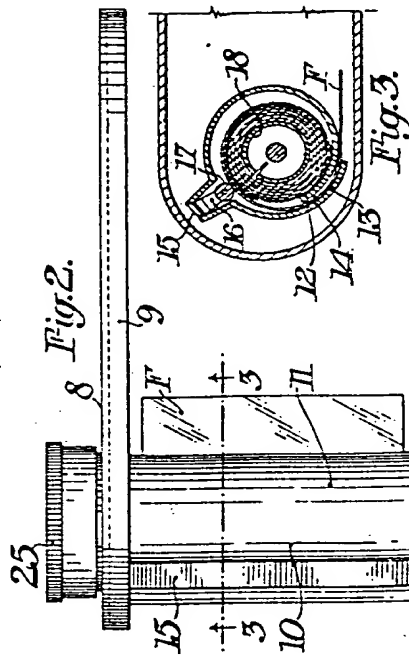
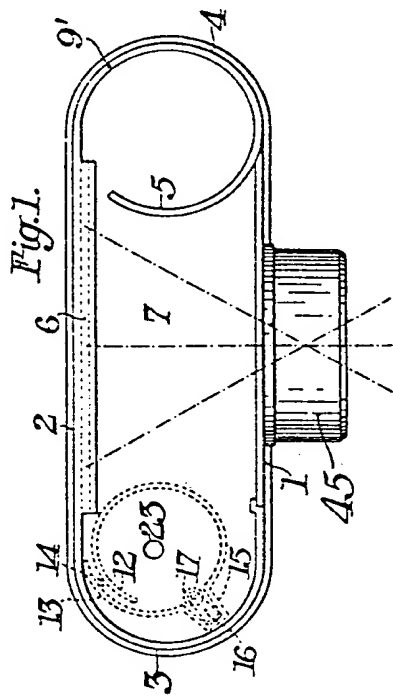
joint with the open end of the spool chamber.

11. A roll film camera substantially as described with reference to Figures 1, 2, 3 and 7 of the accompanying drawings.

12. A film spool for a roll film camera substantially as described with reference to Figure 4 or Figures 5 and 6 of the accompanying drawings.

Dated this 7th day of December, 1931.

KILBURN & STRODE,
Agents for the Applicants.



[This Drawing is a reproduction of the Original on a reduced scale]